Glacier ice C is the same piece as B, cut rather shorter. The rates of extension given here are of course the mean of the rates observed on the two sides of the bar, which were generally far from being equal. Sometimes the greater speed would fluctuate from one side to the other; in other words, the bar would bend first one way then the other. In other cases one side would always extend faster, *e.g.* in glacier ice D the total extension of one face was 2·9 mm., of the other 9·7 mm. The breaking tension we found in the bath ice to be about 8 kilos per sq. cm., but for obvious reasons we did not care to approach this limit too closely. One curious fact deserves notice. The icicle, which was built up of very small crystals, stretched very slowly; while, on the other hand, the most plastic of our pieces of glacier ice contained one very large crystal. This may have been accidental, or it may have been due to the impurities. The fewer the interfaces the greater the quantity of soluble salts at each.

Let us compare the figures in the table with the plasticity actually observed in glaciers. Heim has collected a number of observations on the increase of velocity from the sides to the centre of a glacier. The most rapid increase he mentions among the Alps is on the Rhone glacier on a line 2300 metres above the top of the ice-fall. At 100 metres from the western bank the mean yearly motion from 1874 to 1880 was 12·9 metres, at 160 metres from the bank it was 43·25 metres. This gives an increase of velocity in each metre across the glacier of 0·000058 metre per hour. The stretching involved in this distortion is shown in the paper to be greatest in a direction inclined at 45° to the direction of motion, and then to amount to 0·0029 mm. per hour per length of 10 cm. Hence the plasticity we have found in hand specimens is amply sufficient to account for the distortion of a glacier, even without the aid of crevasses.

It may be said that the term plasticity can not be properly applied to the property of ice that I have described, but there is no other convenient word. Further, it is quite possible that sealing-wax and pitch may be built up of microscopic or ultra-microscopic crystals, and that their plasticity is fundamentally similar to that of ice, the difference being merely one of scale. Helmholtz has suggested somewhere that ice, with its definite and easily ascertainable structure, may furnish the clue to the solution of many difficult problems in the properties of matter.

JAMES C. MCCONNEL.

## NOTES.

AT the annual meeting of the Paris Academy of Sciences on December 24, the Bordin Prize, awarded for perfecting the theory of the movement of a solid body, was awarded to Madame Sophia Kovalevsky, a professor at Stockholm University, and a lineal descendant of Matthias Corvinus, King of Hungary from 1458 to 1490. In astronomy, the Valz Prize was awarded to Mr. E. C. Pickering, and the Janssen Prize to Dr. William Huggins. The Montyon physiology prize was divided between Mr. Augustus D. Waller and M. Léon Frédéric.

DR. SCHWEINFURTH has removed his residence from Cairo to Berlin. The German Government has placed at his disposal a house for the accommodation of his African collections, which after his life-time will become the property of the State, but in the meantime remains in his charge, the Government meeting all the expenses of their maintenance.

AT present Dr. Schweinfurth is on his way to Arabia Felix for the purpose of making botanical collections in the mountains of Yemen. Judging from what is known of the limited but extremely peculiar flora of Aden, and from the specimens which Major Hunter, the assistant Resident at Aden, has transmitted to Kew from the interior, the results of Dr. Schweinfurth's explorations are likely to be of the very greatest interest.

A NEW part of the "Scientific Results of Prjevalsky's Expeditions" has just been published by Prof. Hertzenstein. It contains a description of the fishes, and is illustrated by eight plates.

DR. FRANÇOIS, of the Science Faculty of Rennes, has been despatched, by the French Minister of Public Instruction, to Tahiti, to investigate thoroughly corals and coral formations there.

IT is intended that the next general meeting of the Association for the Improvement of Geometrical Teaching shall be held at University College, Gower Street, on January 19, 1889. The morning sitting, at which the Reports of the Council and the Committees will be read, and new officers and members elected, will begin at 11 a.m. After an adjournment for luncheon at 1 p.m., members will reassemble at 2 p.m., when an address will be delivered by Prof. Minchin, of Cooper's Hill, on "The Vices of our Scientific Education."

LAST Friday, Mr. Mundella asked the Chancellor of the Exchequer whether he was able to remove the uncertainty and embarrassment of the provincial Colleges by publishing his scheme for grants in aid; and whether, in consideration of the delay which had already taken place, and the pecuniary position of several Colleges, he would provide that the grants should take effect from January 1 next. In reply, Mr. Goschen said he was not able to make any statement as to the particulars of a scheme for grants in aid to University Colleges in the provinces. In any case it would not be possible for the grants to take effect from January 1 next, as they would be included in the Estimates for the financial year 1889-90, nor could the grants be of such amounts as to retrieve the position of any College in serious financial embarrassment. Government grants, though they would be a valuable addition, could in no case be, and were not intended to be, an effective substitute for local contributions, which must always bear the greater share of the burden. With respect to the scheme in general, Mr. Goschen was anxious to state that any delay which had arisen was due entirely to the number and importance of the subjects competing for the attention of the Government during the session. The Government regarded grants to local Colleges as a step of great importance, and possibly of far-reaching effects. It was absolutely impossible to propose a scheme without the most careful consideration of its bearings, more especially the proportions and the conditions on which any assistance from Imperial funds should be given to local institutions for higher-class education. It was not from any neglect of the matter, but rather from their sense of its extreme importance, that the Government had not been able to formulate their proposal, although they hoped to do so at a very early date.

AT a recent meeting of the Senate of the Sydney University it was announced that the Hon. William Macleay, besides presenting to the University his valuable museum of natural history, which comprises specimens from all the Australian colonies, New Guinea, and the various groups of islands in that quarter of the globe, has also given the sum of £6000 to endow a curatorship for that museum.

WE learn from *Science* that Mr. J. W. Osborne, of Washington, the well-known inventor of photo-lithography, has presented to the United States National Museum and to the Art Museum in Boston his large and valuable collection of proofs and specimens illustrative of the development of photo-mechanical printing. All the important and typical processes are fully represented in each by specimens collected by Mr. Osborne in the art centres of Europe and America, and include the works of all who have in any measure achieved success in the graphic arts. As soon as it can be properly classified, the collection intended for the National Museum will be exhibited in the section of graphic arts. Mr. Osborne's contribution, the Museum authorities assert, has laid a substantial foundation for an exhaustive collection of kindred productions under Government auspices at Washington.

M. BIALOVESKI, of Oostnamenogorsk, Western Siberia, writes to us to suggest that an international journal of geology is greatly needed. Geology, as he points out, is making continual progress, and the number of investigators steadily increases. It is difficult for students to keep up with the advance of the science, since many important communications are contributed to periodicals which are not generally accessible. An international journal, our correspondent thinks, would supply exactly what is wanted. He suggests that it should be edited in some great centre, such as London or Paris, and that the language adopted should be either Latin or English. The question might perhaps be discussed with advantage at the next meeting of the International Geological Congress.

THE geological history of the Caspian depression is the subject of a remarkable article, by N. Andrusoff, in the November number of the *Izvestia* of the Russian Geographical Society. All that is known about the geological structure of the Caspian depression and the surrounding highlands has been turned to account by the author, and he carefully distinguishes between fact and hypothesis. He gives, first, a condensed but well-conceived description of the Caspian Sea; then he analyzes the geological structure of the Great Balkhans in the Transcaspian region, the two parts of the Caucasus—Western and Eastern—and the mountains of the Crimea. He comes to the conclusion that the upheaval of the Crimea-Caucasus-Balkhan system began after the Jurassic period in the Crimea, and was continued through the Chalk period. A considerable raising took place during the earlier parts of the Tertiary period, and the Miocene epoch was characterized by subsidences, especially in the south. Great changes in the relative altitudes of the region followed after the Sarmathian period. Then he sharply separates the two parts of the Caspian Sea—the shallow northern part, and the deep southern part—which originated in different ways, and at different epochs. The history of the basin during the Tertiary period is treated in detail. The want of data for reconstituting it in full is indicated with great precision, but a map is given to show approximately the extensions of the sea during the periods after the middle Pliocene period. Finally, the fauna of the Caspian (a full list of which, including 187 species, is given), and its bearing upon the question, as well as its probable origin, are discussed. The paper is so important that we hope it may soon be translated into English.

THE same number of the *Izvestia* contains a paper on the earthquake of May 27, 1887, at Vyernyi (already described in NATURE); a note on the geodetical connection of Spain with Algeria, by General Stebnitzky (with a map); and a note, by A. Zolotareff, on the surface and population of Persia. Measured on Petermann's map, the surface of Persia appears to be 29,986 square geographical miles, while the probable population is taken at 6,000,000. Two instructions, one for observations on shifting sands, and another for meteorological observations by travellers, are issued in the same number by the Council of the Society.

IN his Annual Report, lately issued, the President of the Johns Hopkins University, Baltimore, presents a very interesting account of the work done at that admirable institution during the past year. The instruction given has never, Dr. Gilman thinks, been more quickening and successful, nor has the progress of literary and scientific undertakings, in charge of the principal teachers, ever been more satisfactory. During the year there has been a noteworthy advance in the facilities for the study of astronomy, theoretical and practical. There has also been a considerable increase in the number of students attending astronomical lectures. In the department of physics the new physical laboratory justifies the expectations which led to its construction; it not only affords increased facilities for instruction, but enables investigations to be carried on with greater efficiency. The only cause for anxiety with regard to this University is the loss of income from the stocks which were given to it by its founder. Strenuous efforts are about to be made to provide new sources of revenue, and there ought to be no doubt as to their success.

THE peninsula of Florida contains innumerable isolated ponds varying from a few square rods to many square miles in area. Many of these are simple hollows filled with rain-water, without any connection with other waters. Some of them are on high ground, where no flood can establish temporary connection with other waters, through which fish might be admitted. The smaller ones often dry up entirely in seasons of drought, yet when filled with water they do not seem to be behind their neighbours in population. They all swarm with fish. For instance, at Orange Heights, in Eastern Alachua County, which is one of the most elevated regions of the State, as is plainly shown by the radiating streams which rise in that vicinity, there is a small pond on the top of the highest elevation in all that region. Mr. Charles B. Palmer, who records these facts in *Science*, says he has twice known this pond to be dry, yet it now contains an abundance of small fish. "How have they been preserved from destruction," asks Mr. Palmer, "and whence came the original stock?"

THE *Times* says that the collection of *Salmonidæ* ova has been made on a large scale this season at the Midland Counties Fish Culture Establishment, Malvern Wells, and Mr. William Burgess, its founder and proprietor, has laid down for incubation large quantities of eggs. Arrangements have been made for rearing such an extraordinary number of fish that the hatcheries are being taxed to their uttermost. Eggs will be received and hatched out, free of charge, for public bodies. The acclimatization of the American whitefish, *Coregonus albus*, is to be attempted by Mr. Burgess, with the co-operation of the United States Fish Commissioners, who have expressed their willingness to forward consignments of the ova of this valuable food-fish, which is held in high favour in America. In order to carry their naturalization to a successful issue, special habitats have been provided of great size and depth, while all that is necessary to their existence has been furnished. The operations of last season have resulted in an extensive distribution of fish in various lakes and other waters in this country. Coarse fish, such as perch, tench, carp, and roach, have been propagated artificially by Mr. Burgess with a success that has induced him to increase his labours in this direction by enlarging his establishment.

THE Minister for Agriculture in Victoria announces that the Government will probably select some land on which to build an institution where attention will be paid to vine-growing solely, under the control of the Central Board of Viticulture.

THE northern limits of the culture of the silkworm are being steadily extended. Experiments made last summer at Astrakhan showed that it could easily be carried on at the mouth of the Volga. Notwithstanding the age of the mulberry-trees, which were planted at Astrakhan thirty-five years since, the results of the experiments proved satisfactory, and 20,000 cocoons were received this year.

WE have on several occasions drawn attention to the progress of the meteorological service in Queensland since Mr. C. L.

Wragge undertook its reorganization about two years ago. We learn, however, from the Adelaide *Evening Journal,* that at the recent Meteorological Conference at Melbourne serious objections were made to the issue of intercolonial weather forecasts from the central office at Brisbane, and that a resolution was passed to the effect that no forecast should be telegraphed from one colony to another. It is evident that if this proposal were carried out, it would practically check the advance in weather prediction which it has been Mr. Wragge's aim to foster, and the suggested alteration was, naturally, strenuously opposed by Mr. Wragge. The success of the service in Queensland is greatly due to the co-operation of the Post and Telegraph Departments, observations being taken at every station in the colony. Mr. Wragge proposes to establish other stations in the far north and west districts, and to examine the climatological factors of the stations generally, with the view of the cultivation of wheat in Central Queensland as profitably as in South Australia.

WE have received from Prof. C. Wagner, Director of the Observatory of Kremsmünster, a discussion of the rainfall and thunderstorms at that place; the paper contains some interesting results, especially with regard to thunderstorms. The Observatory is situated in lat. 48° 4′ N., and long. 14° 8′ E. (in Austria), and possesses a very long series of observations, dating back to 1763. The older series, from 1763–1851, have been discussed in vol. i. of the Vienna *Jahrbuch,* 1854. The first rain-gauge was erected in April 1820, so that Prof. Wagner is able to publish the observations for each month of the years 1821–87, one of the longest periods existing, yet he finds that the period is too short to determine with accuracy the range of the rainfall for single months. The average yearly amount is 38·5 inches. The greatest falls occur in July, the least in February, and there is a second maximum in November. It would appear that the rainfall has increased latterly: dividing the series into two periods, it is found that the average number of rainy days from 1821 to 1850 is 123·4, and from 1851 to 1887, 142·8 days. The thunderstorm observations are given for each month since 1802. The average number of storms yearly is 35; they occur mostly in June and July. During the whole eighty-six years only one storm occurred in December. The author gives the daily and yearly range according to the direction of the storms, and also the daily range without reference to direction. These tables show a regular period of frequency. The maximum occurs from 4h.–5h. p.m., the number then decreases until 7h. p.m., and from 7h.–8h. there is a second maximum. A third maximum also occurs from 1h.–2h. a.m. He also investigates the possible influence of the moon on the frequency of the storms, and finds (as has before been observed at Prague) that a maximum occurs at the times of the full moon and last quarter. The same fact shows itself when the series is divided into two sets.

A SHOCK of earthquake was felt at Tashkent, on November 28, at 11.40 a.m.

THE Caucasian papers give the following details as to the earthquakes which were felt at Kars and the neighbouring region in September last. The first shock was felt at Kars on September 23, at 3.25 a.m.; it reached its maximum intensity on the high left bank of the Kars River, where several crevices appeared in the barracks of Mukhlis, while on the right bank of the river, which is flat and low, it was felt with much less intensity. The direction of the earthquake was from south-west to north-east. The second and third shocks were felt at 6 and at 9.30 a.m. respectively. They were feeble, and were followed, at 3.20 p.m., by a much stronger shock, which lasted for about five seconds, and had the same direction. A new shock followed at 8.25 p.m.; it had the same direction, but the undulatory movement of the soil was also accompanied by vertical shocks. The direction of the undulatory movement of the soil seems to have taken a more northern direction in the next shock, which was felt at 11.20 p.m. Several shocks followed during the night and the next morning, and a very strong shock, lasting for about ten seconds, was felt on the next day at 2.35 p.m.; its direction was, first, towards the north-north-east. A vertical shock soon followed. Crevices appeared in most buildings, and several houses in the Armenian village Tchighirgan were destroyed. Strong shocks followed at 10.5 and at midnight. On September 13, the earthquake was continued by several slight shocks and a strong one at 9 a.m.; next day, there was a slight shock at 11.25 a.m. This was almost vertical; but an improvised seismometer shows a deflection of the point towards the north. In the Ghel division of the Ardahan district, the same shocks were felt, and had more serious consequences. In the villages of Altunbulack, Hoshtulbent, Plor-mori, Mehkerek, Shaki, Tondash, Kalpikor, and Kundun-su, most houses were destroyed. Five persons were killed.

AT the last meeting, November 16, of the Russian Geographical Society, D. N. Ostrovski made an interesting communication upon the Lapps. Their numbers are estimated at 28,000, of whom 25,000 are living in the territories of Sweden and Norway, and the remainder in Russia and Finland. Almost all the Lapps who live in Sweden are nomads; those who stay in Norway are half nomadic. Those of Finland are all settled, and some of them even have no reindeer; a school was opened for them last year. Sea fisheries are their chief occupation. At the end of the summer they fish in the lakes in the interior of the Koha peninsula, and in the winter they stay in their small houses (*tups*) in the neighbourhood of the marshes covered with moss, where their reindeer obtain food. Their settlements spread in Norway only as far as the 62nd degree of latitude, but in Finland they go as far north as Lake Enare. Their former dwelling-places were farther south, but they were compelled to migrate northwards by the Finns, who steadily extend their settlements in this direction, clear the forests, and take the best grazing-grounds. The folk-lore of the Lapps is full of traditions about their struggles with the Finns. The opinion formerly entertained as to their dying out is not quite exact, although it is true that the Lapps are being steadily absorbed by the Finns. A rich collection of photographs, and samples of various domestic implements, and of the dress of the Lapps, have been brought in by M. Ostrovski.

A CORRESPONDENT, writing from Glasgow, describes the following incident, an account of which was given to him by an eyewitness. It occurred at Dumbarton on Friday, the 17th inst. A hare came across the marsh or common there, on to the embankment of the River Leven, near the slaughter-house at present being erected. At the same time a man came along the embankment of the river, making for the new building. The hare, seeing her escape cut off by the man on one side, and by the workmen at the building on the other (she might have escaped across the marsh, the way by which she came, as she did not seem to be pursued), took to the water and swam across. But, unfortunately, at the opposite side her landing was barred by another man. When she saw the danger, she turned, and made for the point she came from, but the man walking along the embankment had by this time come up, and was awaiting her return. On approaching the bank, and seeing that escape was hopeless, the hare gave up, and made no further effort. The man then stepped into the river, and getting hold of her, extinguished any life that was left. "Is it a common occurrence," asks our correspondent, "for the hare to take to the water? I never read or heard of it before."

DR. CROLL, F.R.S., has just completed a volume on "Stellar Evolution and its relations to Geological Time." It will be published immediately.

A THIRD edition of the well-known "Orient Line Guide," by the Rev. W. J. Loftie, has been issued by Messrs. Sampson Low. The abandonment of the Cape route, as the editor points out, has left room for expanded notices of places hardly mentioned in former editions. The whole plan of the volume has accordingly been changed. In its present form the work contains a continuous narrative of a voyage from London to Australia, broken only by a journey home from Naples, and by various interesting excursions. In the accomplishment of this difficult task Mr. Loftie has received aid from several eminent writers, whose contributions add largely to the value of the book.

THE "Record of the Excursions of the Geologists' Association—1860 to 1884," which has been prepared by Mr. T. V. Holmes, F.G.S., is now ready for the press, but it will not be printed until a sufficient number of subscriptions have been promised. The work will consist of over 500 pages, and contain accounts of all the sections and districts visited by the Association down to the end of 1884, with the illustrations (sections, &c.), which have from time to time appeared in the Circulars and Proceedings.

THE Gamble Prize Medal at Girton College has been awarded to Miss Marion Greenwood, certificated student of Girton College, for an essay on "The Digestive Process in certain Simple Organisms—Amœba, Actinosphærium, and Hydra."

"M. F." has sent to the *Times* a list of sixty-nine different species of wild flowers which have been found in blossom during the present month in the neighbourhood of Hardingham, Norfolk. "This fact," he says, "is no doubt partly accounted for by the unusual mildness of the season, but it also speaks well for the climate of the eastern counties, which has been given, I think, a worse character than it deserves. I can vouch for all the flowers being genuinely wild, as they have, without exception, been gathered by my sisters or myself. Among the most remarkable are poppy, white ox-eye, strawberry, pimpernel, primrose, and field scabious."

THE Report of the Director of the Colombo Museum for the past year says that the Reports which have been written by him on the collection of snakes, lizards, and frogs have been printed, and that on the birds is in the press. The Report on the monitors and skinks is finished, but is yet in manuscript. A Report has also been written on the butterflies, to the end of Nymphalidæ, and on the moths to the end of Bombycides. These two latter are not to be printed for the present, for it is hoped that the notes will be supplemented; and it is suggested that the classification and nomenclature be made the same as those adopted in De Nicéville's book on the butterflies of India, which will soon be published. The difficulties met by the Director in the formation of a collection have been many. The entomological specimens have been with difficulty preserved from the attacks of fungus and mites. A strong solution of creosote and benzene was found to be perfectly useless, but sponges soaked in citronella oil and placed in the cases have been fairly successful. At present, the mode of treatment in the Museum is as follows. When the insect is removed from the setting-board, its body is bathed in benzene, and if this does not keep the mites away, the bath is renewed; in case of fungus, the insect is touched with a solution of carbolic acid in benzene, and, as has been just mentioned, sponges soaked in the best citronella oil are always kept in the cases. That this method is effective is shown by the fact that there are specimens in the collections for the past fifteen or twenty years which have been treated in this way, and are now free from attacks. During the past year a great improvement has been made in the transportation of insects to the Museum. A layer of naphthaline is put at the bottom of tins, such as are used for tobacco and butter, then a layer of cotton-wool is spread over this, then a layer of insects, and so on till the tin is filled with alternate layers of wool and insects. By this means the insects are kept relaxed for upwards of a fortnight, and there is thus time to despatch them from any part of the island to Colombo. This plan is far superior to that formerly in use by insect-boxes, setting-boards, and all the other necessary apparatus which were carried from place to place at great trouble and expense. Mr. Haly hopes to establish stations throughout the island, from which insects may be sent from time to time to Colombo. In searching for marine fauna, Mr. Haly found that the dredge employed by naturalists in Europe is almost useless in Ceylonese boats; but one similar to that used by Prof. Agassiz in the Gulf of Mexico, with lighter arms than the common European one, and with perfectly flat scrapers, answered very well. Some fossil crabs from Kuchavelli have also been collected during the past year. In other departments the Museum has been enriched by various rare and interesting specimens.

THE additions to the Zoological Society's Gardens during the past week include a Ring-tailed Coati (*Nasua rufa*) from Pernambuco, presented by Mr. J. W. Bell; a Blue-fronted Amazon (*Chrysotis æstiva*) from Brazil, presented by Miss Hayes; three Common Partridges (*Perdix cinerea*), British, presented by the Rev. F. T. Scott; two Moorish Geckos (*Tarentola mauritanica*) from the South of France, presented by Masters F. and O. Warburg; an Egyptian Cat (*Felis chaus*), a Paradoxure (*Paradoxurus* sp. inc.) from India (?), two Long-tailed Fowls (*Gallus domesticus* var.) from Japan, deposited; a Yellow-footed Rock Kangaroo (*Petrogale xanthopus*), born in the Gardens.

## OUR ASTRONOMICAL COLUMN.

MADRAS MERIDIAN CIRCLE OBSERVATIONS, 1865, 1866, 1867.—We have recently received from the Director of the Madras Observatory, the "Results of the Observations of the Fixed Stars made with the Meridian Circle at the Government Observatory, Madras, in the Years 1865, 1866, and 1867," and are glad to see by its appearance that Mr. Pogson is continuing his efforts to remedy the most deplorable delay which has attended the publication of the observations made under his care. The present volume is in continuation of the one which appeared a year and a half ago, and which contained the results for the years 1862–64. The instrument employed and the class of objects observed were the same as in the three earlier years; the objects selected being the moon and moon culminators, Mars and companion-stars, minor planets, the brighter stars down to the fifth magnitude, and as many unnamed stars as possible below 120° N.P.D., and not fainter than the eighth magnitude. The present and preceding volumes have been confined to stellar observations, and these are given separately for each year in the twofold form of star-ledger and annual catalogue. The Star Catalogue will follow at the conclusion of the publication of the results for the separate years, and it is hoped that it may be succeeded by a volume of planetary and cometary results. Very little interest or value now attaches to these sadly overdue volumes of annual results, except as an indication that the evil of delayed publication is now really recognized, and as affording a hope that the one really useful work, the General Star Catalogue, may soon appear. It is but due to Mr. Pogson, however, to remember that his position is one which has presented many difficulties, seeing that he had, as he states in the present volume, "no European assistance, and too inadequate a staff of natives even to admit of duplicate calculations."

COMET 1888 *e* (BARNARD, SEPTEMBER 2).—One of the positions from which Dr. Becker computed the hyperbolic orbit for this comet (NATURE, November 29, p. 114) has been found to be in error, as compared with neighbouring observations by as much as 13″ in declination, and fresh normal places having been formed a parabola is found to satisfy them well The following